

tables, and even with such a well-known gas as carbon dioxide they have not been completely determined. It has become more and more necessary for the engineer or manufacturer to be familiar with the scientific researches and theoretical considerations which lie at the base of his industry, and Germany has come to be looked upon as the leader in fundamental work of this sort, but the "Neuere Kühlmaschinen" of Prof. Lorenz makes no pretence to be of this comprehensive character. While refrigerating machinery is sufficiently simple, the principles on which it is based are not so easy of comprehension to the working engineers and business men who use it industrially. As a handbook for men of this class and as a *résumé* of the subject, this manual has long been known in Germany and on the Continent. Various editions have been published as a volume of the "Technische Handbibliothek," and the present translation under the title of "Modern Refrigerating Machinery" is from the edition of 1901.

No space is taken up by a historical introduction, but after some pages of an elementary character on the principles of heat there follows a chapter on "Methods of Cold Production," which gives a well arranged and concise description of the manner in which refrigeration is produced by different methods and of the energy required. The chapter on compressors treats chiefly of the important details of the machines, and wisely does not touch upon matters which belong more properly to generic and not to special machine design, and has some instructive indicator diagrams. The chapters which follow deal with condensers and evaporators, the cooling of liquids and air, and the manufacture of ice. They describe clearly the chief features of the matter under discussion, and do not enter upon general descriptions from which it is difficult to decipher the essential points. The pages devoted to very low temperatures, written four years ago, have now become merely of historical interest. The final chapter, on the performance of refrigerating machines, or, as the translator calls it, "The Yield of Cooling Machines," contains the only higher mathematics in the book, which contrast rather strangely with some of the simple definitions at the beginning. The translation is poor. The German original is closely followed. Such sentences as "tightness towards gases requires, besides faultless material, as small a number as possible of tubulures and stuffing boxes" are not very clear to an English mechanic, nor does the constant use of italics for the more important words add to the attractiveness of the pages. The illustrations are numerous and excellent, and the cuts are superior to those in the German edition.

In the same volume, though the pages are numbered consecutively, is a separate work on "American Practice in Refrigeration." It contains some admirable illustrations and useful data in regard to the construction of cold storage rooms, but it is not quite apparent what purpose the American authors could have in view in reprinting tables from such well-known books as those of Siebel and Wallis-Tayler.

C. H. B.

OUR BOOK SHELF.

The Geography of New Zealand. By P. Marshall. Pp. x+401. (Christchurch, N.Z., and London: Whitcombe and Tombs, Ltd., n.d.)

THE author claims to have written "according to the spirit of the New Geography," to give due consideration to the influence that the relief of the land has upon the circulation of the atmosphere, the climate, the distribution of flora and fauna, and the settlement of population; he explains that the latter is influenced considerably by the distribution of mineral deposits, while the nature of the industries affects the commerce of the country and shapes its political institutions.

The work is for this purpose divided into three parts, under the headings (1) historical, (2) physical, (3) political and commercial. There is a valuable introduction by Prof. Gregory, and an important chapter on geysers by the same writer, in which, however, he erroneously alludes to Strokkur as being still an active geyser, whereas it ceased to erupt in 1895. The chapter on earthquakes by Mr. G. Hogben deserves special mention; the several kinds of earth movements and their registration by the seismograph are described. Of special interest to all lovers of Ao te Roa—the unscientific reader as well as the geographical student—are the chapter on the Maoris, by Mr. A. Hamilton, and the descriptions of various unique natural beauties.

At times the style is very explanatory and the matter original. Occasionally the author's meaning is somewhat vague, as when he writes:—"the high mountainous land here reaches the sea, and is in fact truncated by it." But on the whole the information given is accurate and concise, and the arrangement throughout careful.

As stated in the preface, the book is not merely the result of the author's and his contributors' personal observation, but is a collection of facts and figures from the previous writings of acknowledged authorities on the islands of which it treats. The letterpress is profusely illustrated with maps, reproductions of photographs, sketches, and old prints. These are all interesting, and many of the sketch-maps serve well to illustrate the text.

M. G. B.

Wild Wings: Adventures of a Camera-Hunter among the Larger Wild Birds of North America on Sea and Land. By H. K. Job. Pp. xxv+341; illustrated. (London: A. Constable and Co., Ltd.; Boston and New York: Houghton, Mifflin and Co., 1905.) Price 10s. 6d. net.

DESPITE its somewhat pedantic title, this book is much above the average of works of the same general nature, and deserves a wide circulation, if only on account of the earnest plea made by its author that the camera may, at least to some extent, be substituted for the shot-gun in our intercourse with birds. In this laudable endeavour he is supported by the President of the United States, who, after stating that wild-game shooting, under proper restrictions and regulations, must be considered legitimate so long as we breed domesticated animals for slaughter, observes that "there is altogether too much shooting, and if we can only get the camera in place of the gun and have the sportsman sunk somewhat in the naturalist and lover of wild things, the next generation will see an immense change for the better in the life of our woods and waters."

The special feature of Mr. Job's book is undoubtedly formed by the illustrations, all of which, we are told, are reproductions—and very excellent ones—of photo-

graphs taken by the author himself. In a country of the size and extent of America, with climates ranging from the arctic to the tropical, and with large tracts of more or less untrdden wastes, the bird-lover and photographer has, of course, vastly greater opportunities (especially among the larger species, to which the author has confined his attention) than his brother in our own islands, and it must be confessed that these opportunities have not been neglected, for a more delightful book, both as regards text and illustrations, it would be difficult to produce.

The breeding colonies of brown pelicans of New England must form a really marvellous sight. On the occasion of the first visit of the author and his party, the boat was run ashore without alarming the birds. "Then," writes the narrator, "we stood up and shouted, but hardly a bird rose. There they sat upon their nests, hundreds and thousands of them, many within forty or fifty feet, solemnly gazing at us. It was not until we sprang out upon the shore that there was any considerable flight, and even then we noticed that it occurred only within a radius of fifty or sixty feet, the rest of the colony remaining on their nests apparently in perfect unconcern." Time after time the colony has been raided by feather and egg hunters, but it is satisfactory to learn that Pelican Island has recently been made by President Roosevelt a Government reserve for wild birds.

Not less interesting is the author's account of the colonies of white ibises and Louisiana herons in the Cape Sable wilderness, this being followed by a fascinating description, with equally fascinating photographs, of the colonies of sooty terns and noddies on "Lonely Bird Key," in the Dry Tortugas group, far out in the Gulf of Mexico. But if we were to cite even a tenth of the passages to which we should like to refer, editorial limits would be far exceeded, and in bringing this brief notice of an admirable bird-book to a close we cannot do better than advise our readers to get copies for themselves.

Instruction in Photography. By Sir W. de W. Abney. Eleventh edition, revised. Pp. 676. (London: Iliffe and Sons, Ltd., 1905.) Price 7s. 6d. net.

This work, which for many years has held the premier position among English text-books of photography, is to a peculiar extent the record of the author's own experiments and investigations, and in the new edition much new matter on the subject of colour photography has been added, the product of the attention which Sir W. de W. Abney has devoted to that branch of photography for some years. In other sections of the book it may be noted that the descriptions of lenses are brought up to date, while the chapter on sensitometry includes a description of Mr. Chapman Jones's plate tester. An entirely new chapter has been added to the book entitled "The Failure of a Photographic Law," and including the well known experiments made by the author upon the effect of intermittent exposures and upon the failure of the reciprocity law. Here also will be found an interesting discussion of the effect of temperature upon the sensitiveness of plates, while the last part of the chapter is devoted to an account of the author's researches upon the effect of different monochromatic lights upon a plate. The book has been entirely reset, larger type being employed throughout and the printing generally improved. No alteration has been made in the theoretical views set forth, and the silver sub-bromide theory of the latent image is adopted in its entirety.

C. E. K. M.

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La Bobine d'Induction. By H. Armagnat. Pp. 228. (Paris: Gauthier-Villars, 1905.) Price 5 francs.

In this book a very interesting account is given of the induction coil in its theoretical and practical aspects. The electromagnetic problems involved are clearly stated, and the various factors which stand in the way of a complete mathematical theory are considered in some detail. The effects of sparking at the interruptor, the parts played by the iron core, by the secondary capacity, &c., are carefully examined and methods of experimental investigation are illustrated. The differences between mechanical and electrolytic interruptors are discussed, and the more purely theoretical part of the book concludes with a chapter on the power and output of a coil and of the factors upon which these depend. The methods of measuring the electromagnetic constants of a coil are indicated, as are the most common sources of breakdown, how they may be detected, and how in some cases remedied.

In the description of the practical construction of coils which follows, the different methods of winding, insulation, &c., are described in detail, and the relative dimensions of the various parts of coils of standard makes are given. The particular features of different types of interruptors, mechanical and electrolytic, upon which efficient working depends are stated clearly (although the action of the commonest mechanical interruptor is not quite so simple as it is made to appear, and might perhaps have been described in greater detail in a book of this kind).

The principles of the action of several special forms, such as Tesla's, of induction apparatus used in practice are given in outline, and a final chapter is devoted to a description of the various uses of induction coils. The range of this chapter is perhaps indicated when it is said that it includes the discussion of such questions as the ignition apparatus of explosion-engines and the production of ozone.

A very useful bibliography, in which the references are in most cases accompanied by short abstracts, completes an excellent book.

Handbook of Metallurgy. By Prof. Carl Schnabel. Translated by Prof. Henry Louis. Second Edition. Vol. i. Copper—Lead—Silver—Gold. Pp. xx+1123. (London: Macmillan and Co., Ltd., 1905.) Price 25s. net.

This volume is a translation of the second German edition which appeared in 1902. Prof. Schnabel has found it necessary to increase the length of the book considerably, the translation being 214 pages longer than that of the first edition. A number of new furnaces and other appliances are described, and in particular the account of the extraction of copper by electro-metallurgical methods has undergone great expansion. The older metallurgical methods are purposely dwelt on by the author, who gives as his reason that a knowledge of the development of metallurgy stimulates inventive genius. It is equally certain that the inclusion of the descriptions of out-of-date methods helps to make books bulky.

The merits and defects of the book remain much the same as in the first edition. It contains a mass of detailed information as to the dimensions of appliances in use at particular works, the analyses of products, and the like, but the discussion of the principles underlying the practice is generally less thorough. This is as much as to say that the book is "practical." Prof. Louis is to be congratulated on the translation, which makes a valuable work available to British students.